

538127

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number
WO 2004/054924 A1

(51) International Patent Classification⁷: **B82B 3/00**,
H01L 21/00, C30B 29/60

(21) International Application Number:
PCT/JP2003/015949

(22) International Filing Date:
12 December 2003 (12.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2002-363130 13 December 2002 (13.12.2002) JP

(71) Applicant (for all designated States except US): **CANON KABUSHIKI KAISHA** [JP/JP]; 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MIYATA, Hi-rokatsu** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**,

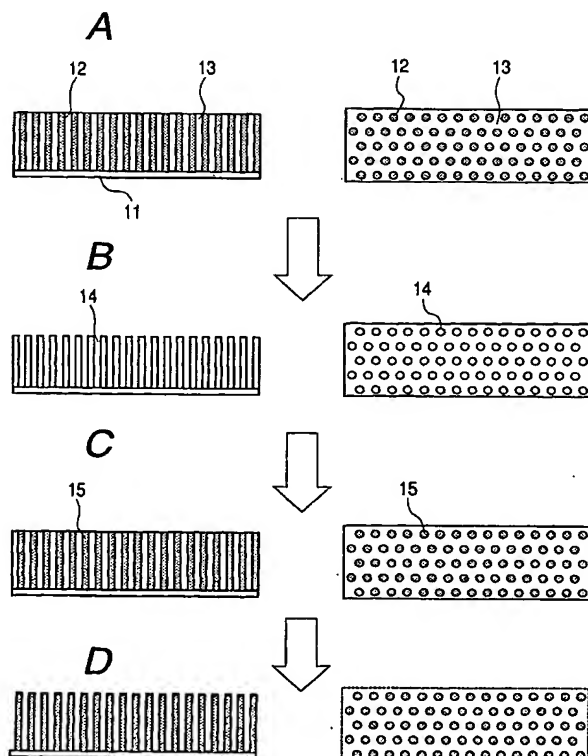
3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **OTTO, Albrecht** [DE/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **KURIYAMA, Akira** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **OGAWA, Miki** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **OKURA, Hiroshi** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **FUKUTANI, Kazuhiko** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). **DEN, Tohru** [JP/JP]; c/o **CANON KABUSHIKI KAISHA**, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP).

(74) Agents: **OKABE, Masao** et al.; No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo 100-0005 (JP).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,

[Continued on next page]

(54) Title: **COLUMNAR STRUCTURED MATERIAL, ELECTRODE HAVING COLUMNAR STRUCTURED MATERIAL, AND PRODUCTION METHOD THEREFOR**



(57) Abstract: To obtain a microcolumnar structured material having a desired material. The columnar structured material includes columnar members 15 obtained by introducing a filler into columnar holes formed in a porous material. The porous material has the columnar holes 14 formed by removing columnar substances from a structured material in which the columnar substances 12 containing a first component are dispersed in a matrix member 13 containing a second component capable of forming a eutectic with the first component. The matrix member 13 may be removed. In the columnar structured material, the filler is a conductive material, and an electrode can be structured by electrically connecting the conductive materials in at least a part of a plurality of holes to a conductor.

WO 2004/054924 A1



CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(84) **Designated States (regional):** ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.